



NOAA FISHERIES

Northwest Fisheries Science Center

A. Introductory Overview

Federal management of groundfish along the Pacific coast of the United States is conducted via the authority provided by the Magnuson-Stevens Fishery Conservation and Management Act, and the provisions of the Pacific Fishery Management Council's (PFMC) Groundfish Fishery Management Plan (FMP). The Northwest Fisheries Science Center (NWFSC) (and previously, the Northwest and Alaska Fisheries Science Center) has been assigned lead responsibility for NMFS groundfish science in this region, and works cooperatively with the Southwest Fisheries Science Center (SWFSC) to ensure that the PFMC is provided with the best scientific information possible to support its management guidance to NMFS. The Fishery Resource Analysis and Monitoring (FRAM) Division is the heart of groundfish data-collection and research at the NWFSC, encompassing collection and analysis of data collected via fishery-independent surveys, onboard fishery observation, and socio-economic surveys, as well as the development of fish stock assessments that integrate data from these and other sources. The SWFSC's Fisheries Ecology Division, located in Santa Cruz, California, is also actively engaged in fishery-independent surveys, analysis, and stock assessments of groundfish.

The PFMC is the principal direct client for groundfish assessments developed by the scientists at both Centers. Terms of Reference for assessments and their review are adopted by the Council, based on recommendations from the NMFS, the PFMC's Scientific and Statistical Committee, other advisory panels, and the public. There are four types, or levels, of assessment, which include 1) benchmark assessments (also referred to as "full" assessments), 2) update assessments, 3) data-moderate assessments, and 4) data-poor assessments. Additionally, the Council "catch reports" as a way of monitoring that fishing mortality has remained below catch limits for some rebuilding species, since their last assessment. Benchmark assessments are reviewed via public Stock Assessment Review (STAR) Panels, which are formally Council-sponsored peer reviews, though organized jointly by the PFMC and NMFS. Since 2004, the PFMC has operated under a biennial management cycle in which assessment reviews for all species except Pacific hake are normally conducted in odd-numbered years. Results from these and prior assessments form the basis of biennial harvest specifications that are analyzed, reviewed, and open to extensive opportunities for public comment before being published as regulations. Indirectly, the West Coast Region is also a client for these science products, as they have responsibility for implementing Council recommendations in regulation, and determining whether those recommendations comport with applicable law and National Standard Guidelines.

Beginning in 2011, the Agreement with Canada on Pacific Hake/Whiting was implemented, with joint US-Canada development and review of hake stock assessments. In accordance with that Agreement, assessments developed by the Joint Technical Committee (comprised by scientists from both countries) are reviewed by the Scientific Review Group (SRG), with harvest limits decided by the Joint Management Committee (JMC).

With commercial fisheries for these groundfish species generating more than \$75 million annually in commercial ex-vessel revenue, and recreational fisheries also contributing substantial

economic benefits to coastal communities, there are numerous indirect clients for groundfish assessments. These include state and local governments, commercial and recreational fishers, coastal businesses that support fishing, fishery interest groups, and non-governmental organizations engaged in marine resource issues.

The Groundfish FMP covers more than 90 species, including over 60 species of rockfish. These species occupy virtually every marine habitat between Canada and Mexico, from the shoreline out to depths greater than 700 fathoms. They are a remarkably diverse collection of species, ranging from highly productive ones, with moderate longevity (up-to 10 years), to slow-growing, long-lived species with maximum ages of 100-150 years. The commercial fishery has been managed under a license limitation program for 20 years, with predominant gears including bottom and mid-water trawls, bottom longlines, and pots, along with an assortment of line gears in nearshore areas. Until 2011, the principal forms of effort control were monthly or bi-monthly cumulative landing limits, covering individual species and assemblages. Beginning in 2011, an Individual Quota program was instituted for shore-based groundfish trawlers, which also included allocations to at-sea sector cooperatives.

The first groundfish assessments were conducted in 1984, employing a variety of simple, data-limited approaches, e.g. Stock Reduction Analysis, Virtual Population Analysis, and trend analysis. Beginning in 1989, following the creation of Stock Synthesis (SS), a higher proportion of assessments were based on modeling approaches that were more similar to post-2000 full assessments. By 1994, 12 species and a 2-species thornyhead assemblage had been assessed at least once using SS. However, considerable assessment effort was focused on a small number of species, with 3 species (hake, Dover sole, and sablefish) accounting for 13 of the 30 SS assessments conducted from 1989 to 1994. Assessments from this period were informed by limited trawl survey data and fishery sampling.

Not long after the passage of the Sustainable Fisheries Act of 1997, assessments for several species indicated that they had been depleted to biomass levels below newly adopted minimum thresholds and were in need of rebuilding. For some species, significant depletion had occurred in the 1960s, with the appearance of large foreign factory ships. For others, the most serious declines occurred during the push to Americanize fisheries within the 200-mile EEZ, during the 1980s and 1990s. The need to rebuild depleted stocks in an expeditious manner led to tremendous changes in the management of groundfish fisheries by the early 2000s. Although these changes have successfully increased the biomasses of many of these stocks to levels above or near their targets, they have also introduced challenges to the interpretation and use of fisheries data in stock assessments.

Over the past decade, assessment methods and their application to FMP species have progressed substantially, as has the quality of the data used in them. Over 40 species have now been assessed using methods which meet agency standards for adequacy, and over 30 of those have been assessed within the last five years (23 as benchmark or update assessments) (see attached table). Since 2001, FRAM Division has instituted two new annual surveys, including the first comprehensive survey of trawlable habitat off the Pacific coast, increased the frequency of another survey, instituted a comprehensive at-sea observer program, and expanded age-reading capacity by more than 30%. These new and expanded data programs have greatly improved the assessment inputs that are available for many species.

Pacific Coast Groundfish Assessments, 2003-2013, by year and type (excludes data-poor).

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	% of SB ₀	in year
Bocaccio	F		F		F		F		U		U	31%	2013
Canary rockfish (rf)			F		F		U		U		cr	23%	2011
Cowcod	U		F		F		U		cr		F	34%	2013
Darkblotched rf	U		F		F		U		U		F	36%	2013
Lingcod	F		F				F					74%	2009
Pacific ocean perch	F		F		U		U		F		cr	19%	2011
Pacific hake/whiting		F	F	F	F	F	F	F	F	F	F	72%	2013
Widow rf	F		F		U		F		F			51%	2011
Yelloweye rf			F	F	U		F		U		cr	21%	2011
Black rf	F				F							53%	2007
Cabazon (CA & OR)	F		F				F					49%	2009
Petrale sole			F				F		F		F	22%	2013
Sablefish			F		F				F			33%	2011
Dover sole			F						F			84%	2011
Shortspine thornyhead			F								F	74%	2013
Longspine thornyhead			F								F	75%	2013
Blackgill rf			F						F			30%	2011
English sole			F		U						DM	89%	2013
Yellowtail rf	U										DM	69%	2013
California scorpionfish			F									80%	2005
Gopher rf			F									97%	2005
Kelp greenling (OR)			F									49%	2005
Starry flounder			F									50%	2005
Arrowtooth flounder					F							79%	2007
Blue rf					F							30%	2007
Chilipepper rf					F							71%	2007
Longnose skate					F							66%	2007
Shortbelly rf					F							73%	2007
Greenstriped rf							F					81%	2009
Splitnose rf							F					66%	2009
Greenspotted rf									F			35%	2011
Spiny dogfish									F			63%	2011
Aurora rf											F	64%	2013
Rougheye/bl.spotted rf											F	47%	2013
Pacific sanddabs											F	96%	2013
Brown rf											DM	40%	2013
China rf											DM	55%	2013
Copper rf											DM	59%	2013
Rex sole											DM	79%	2013
Sharpchin rf											DM	89%	2013
Stripetail rf											DM	78%	2013
Full/Benchmark	6	1	21	2	12	1	9	1	9	1	9		
Update	3	0	0	0	4	0	4	0	4	0	1		
Data-Moderate	0	0	0	0	0	0	0	0	0	0	8		

Periods highlighted in pink indicate years in which a stock was managed under a rebuilding plan

F = Full assessment

DM = Data-moderate assessment

SB₀ = Unfished spawning biomass

U = Update assessment

cr = Catch report